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ABSTRACT

The activities of the Nucleus Testing Committee of the Madison County (Wisconsin) Schools in developing a new student testing program are discussed, and suggestions for the development of appropriate testing procedures are given. An individualized learning packet, developed by the author, using the psychological and educational modalities of learning as a pre-requisite to developing a body of content which logically would follow the structure and stage sequence of cognitive learning is provided as an appendix to the paper. It is concluded that criterion-referenced or program-fair assessment techniques utilizing sampling procedures is far more advantageous as a testing or evaluation device than is the normative approach to testing. (DB)

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AN ADMINISTRATIVE VIEW

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Introduction

Upon the direction of Dr. Douglas S. Ritchie, Superintendent of the Madison Public Schools, the Director of Curriculum was given as one of his initial tasks the responsibility of developing a viable, realistic and flexible testing program to meet the educational needs of the students, of the system, and of its various consumers. With this focus as the prime guiding principle, this writer met with his newly appointed but very competent researcher in the Curriculum Department, Dr. Walter Mathews, to develop and coordinate what was felt to be the first nucleus testing cadre of teachers and administrators in the nation. The primary purpose of the Nucleus Testing Committee as organized was: (1) to evaluate the present Madison standardized achievement testing program, (2) to train and provide appropriate testing and research skills and expertise to members of the Nucleus Testing Committee and teachers within each individual school in the Madison district, as well as providing a direct liaison between central office personnel with the Nucleus Testing Committee, and (3) to recommend a new testing program compatible with the initial charge as directed by the Superintendent of the Madison Public Schools.

The organization that was structured to develop a new testing program generated much interest as well as anxiety and concern among many of the teaching faculties and some administrators of the Madison school system. This concern centered basically around the "change" process which deviated from the status quo which was the accepted standardized

achievement testing program as implemented and currently operational in the Madison Public Schools for the past five years. To assist us in this "change" process Dr. Anne Cleary of the University of Wisconsin donated her talent and services to head the Nucleus Testing team as well as to achieve the objectives as previously stated. The "change" process that was initiated followed "change theory" and research skills which utilized a democratic approach--yet operated within a pre-defined structure which guaranteed mobility and direction which resulted in process of evaluation and a new testing product. As the change process accelerated, the Madison Nucleus Testing Committee initiated serious overtures which resulted in a needs assessment as determined by the many questions which ultimately lead to the establishment of a newly formed testing program.

Normative Tests

This writer found in coming to the Madison Public Schools that the basic standardized testing program consisted mainly of normative standardized tests. This writer wishes to state emphatically that he rejects most normative tests per se since they are in conflict not only with most parts of education, but also in conflict with organizational patterns which deal with the individualization of instruction, continuous progress plans, team teaching, flexible scheduling, learning packets, unipacs, etc. In addition, many of the assumptions of normative tests must be rejected as one equates and identifies abilities with learning as influenced by one's educational environment. Raymond Cattell in his very provocative and interesting article "Theory of Fluid and Crystallized Intelligence: A

Critical Experiment" as published in the Journal of Educational Psychology states that there are at least two different kinds of intelligence. He defines one as "crystallized" ability, which is an influence not only of one's innate potential but is directly influenced by environmental factors. The second ability he defines as "fluid" ability which is said to be the major outcome of the influence of biological factors on intellectual development and is the result of one's chemistry and well as having very little to do with one's interaction with one's environment. Normative tests per se deal more with crystallized abilities and are therefore subject to biases, cultural interventions, that may or may not influence "fluid" abilities as they lead to alternate avenues of learning. In addition, J.P. Guilford in her article entitled "Three Faces of the Intellect" discusses different modalities of learning. It is hypothesized that there are at least sixty or more abilities classified within three categories which each individual possesses. The three kinds of classification of the factors of intellect can be represented by means of a single solid model (see appendix A). "In this model, which we call the "structure of intellect" each dimension represents one of the modes of variation of the factors. Along one dimension are found the various kinds of operations, along a second one are the various kinds of products, and along the third are various kinds of content."[1] The typical intelligence test as well as the standardized achievement test measures generally crystallized environmental stimuli and abilities while measuring relatively few of the fluid abilities as defined by Raymond Cattell. For example, does a standardized achievement test measure "ego strength?"

In attempting to answer these questions and other questions, the Nucleus Testing Committee initiated a needs assessment which attempted to cope and to answer these provocative questions. The Nucleus Testing Committee in their study and deliberations decided that most achievement tests are in fact reading tests and that it would be more productive for the system to administer on a staggering basis more reading tests rather than a complete battery of standardized achievement tests. These reading tests, since they correlate highly with standardized achievement tests, provided the basis for the newly formed testing program within the Madison Public Schools. In addition, the Nucleus Testing Committee encouraged within the testing structure the adoption and move towards criterion-referenced tests as well as the movement towards "program-fair tests" for the ensuing 1971-72 school year.

Learning Theory

It is also this writer's opinion that education in general under a traditional standardized testing program may be evaluating a peripheral product rather than a direction cognitive product. For example, we tend to define a body of knowledge as something that is applicable to all youngsters using norms as established under a standardized testing procedure. Recent learning theorists such as Piaget, Ausubel, Gagne, and Merrill, for example, have suggested that perhaps we should be looking at the psychological and instructional modalities of learning as a pre-requisite and antecedent to a defined body of knowledge. This author has developed an individualized learning packet using the psychological and educational modalities as a

pre-requisite to developing a body of content which logically would follow the structure and stage sequence of cognitive learning (see appendix B). For example, in Piaget's stage learning theory (see appendix C) he defines and specifies according to age and according to stage the learning modalities of children. Normative tests generally do not take into account the psychological modalities as an antecedent to learning.

"A proposed theory of instruction is Merrill's paradigm of instruction (see appendix D.) The basic importance of any system of instruction is the sequence of presentation. Merrill distinguishes the type of behavioral outcomes in reference to conditions of learning. Two additional categories are added to Gagne's original eight, thus extending the types of behavioral outcomes thought to account for all learned behavior to ten. These ten categories are arranged in four levels, with three subdivisions in all except level one. The four levels are emotional behavior, psychomotor behavior, memorization behavior and complex cognitive behavior. This distinction corresponds, to some extent, with that made by Bloom between cognitive, psychomotor, and affective. Cognitive is divided into memorization and complex cognitive. Emotional behavior, in this scheme, has a considerably different relationship to the whole than does Krathwohl's affective domain. The four levels are hierarchical in that the behavior at a higher level includes some kind of behavior from each of the lower levels as a pre-requisite. The most simple behavior in each level is on the left and

the more complex on the right. Merrill has defined his instructional constructs in compliance with Travers' demand for constructs with terms which are not only new, but which also can be operationally defined without surplus meaning. Merrill's paradigm of instruction extends the work of Bloom and Gagne (see appendix E)."[2]

This writer suggests that educators should stress the psychological modalities as well as a specification of behaviorally stated objectives according to defined stages of intellectual development and prescribe content according to each youngster as it relates to his own development utilizing a continuous progress assessment prescription and evaluation procedure. "An instructional design usually begins with the specification of behaviorally stated objectives. Teachers and other educators have struggled for long hours in attempts to identify the behavior thought to be necessary or desirable in given subject matter areas. It is suggested that perhaps many attempts to specify objectives have approached the task backwards, by trying to identify the objectives that are implied by the subject matter. It has been suggested that an instructional designer imposes behavioral levels on the subject matter and not vice versa. It is further suggested that, in writing objectives, the first step is to select the behavioral level desired prior to writing objectives, examining subject matter for implied objectives, etc., and that having decided on the behavioral level thought to be desirable for a given instructional sequence, the next step is to carefully specify the psychological conditions appropriate

for that level. Third, having selected a level and identified the conditions, the next step is to interpret these conditions and the behavior required within the context of the subject matter under consideration. At this point conditions specific to the subject matter should also be identified. Fourth, having identified the behavior and conditions for the desired level and having made this specific to the subject matter, the next step is to establish criteria for acceptable performance. This, of course, requires identifying the function of the objective -- whether it is general, enabling, terminal, etc.

Starting with a behavioral category system, objectives are much easier to specify than when one starts from scratch. Much of the difficult task is done. That is, the behavior required for understanding, comprehension and other ambiguous complex behavior is specified by the category system. Further, the psychological conditions which are necessary for an adequate observation of this behavior are also specified and merely need to be interpreted for the particular subject matter under consideration. The instructional designer does not need to struggle with the subject matter in an attempt to determine the behavioral level implied, but sets the level and interprets the subject matter to meet the conditions required by this level."

Program Evaluation

Following the psychological approach as recommended by Piaget, Gagne, and others this writer suggests that the normative approach to

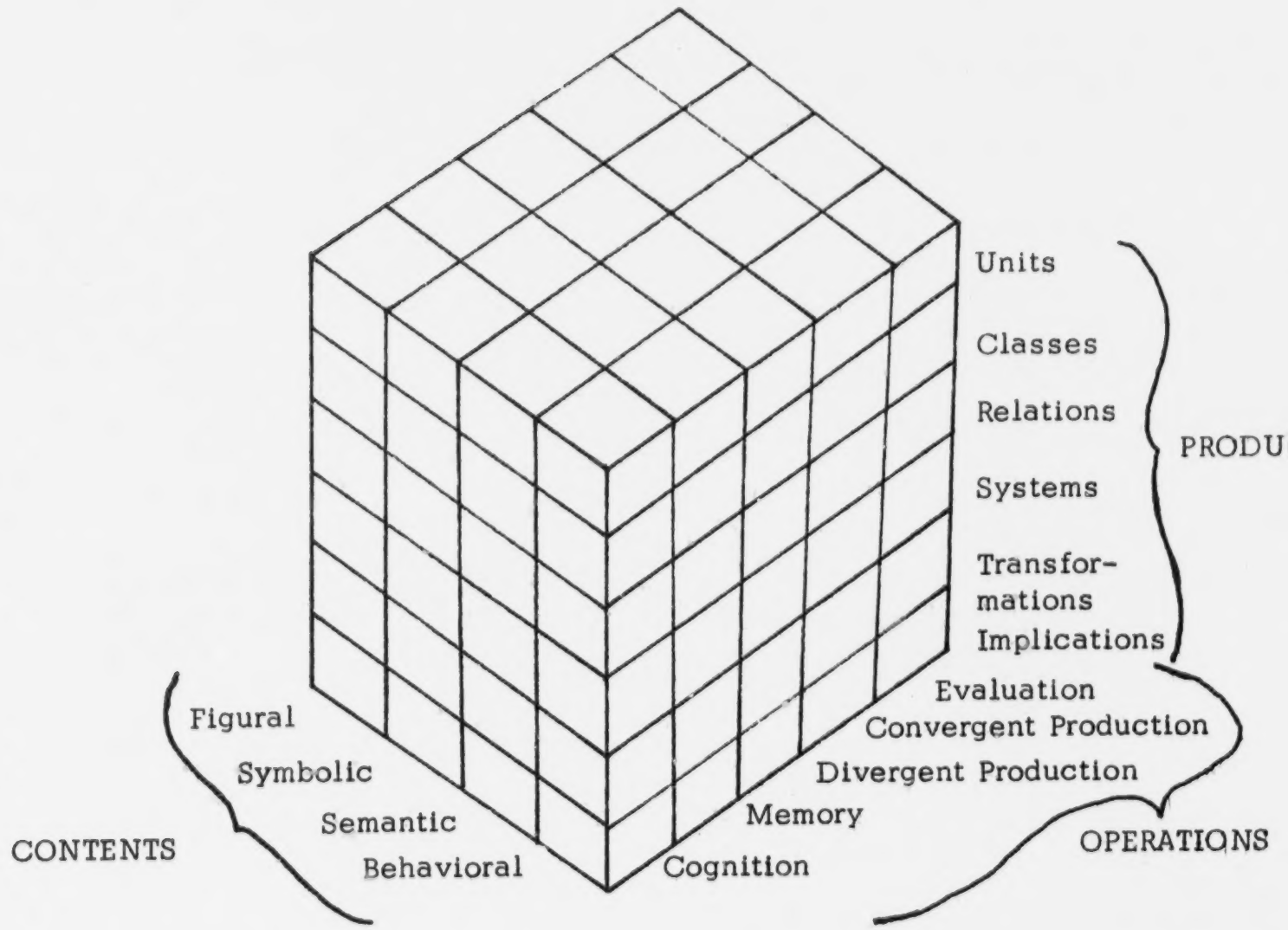
testing may be obsolete since it gives a rather general profile of the performance of youngsters at a particular time under a particular set of circumstances. It would seem logical that criterion-referenced or program-fair assessment techniques utilizing sampling procedures would be far more advantageous as a testing or evaluation device enabling educators and decision-makers to utilize appropriate data which then can be generated to useful information as it pertains to decisions in the teaching-learning process within the establishment of a new education organizational structure. In addition, this approach offers a system to interrelate the subparts into that total system. The individual systems components are themselves maximized and this allows curriculum development to focus upon a prescription based upon psychological modalities, a structure of knowledge which is ordered in a hierarchy of terminal and sequential objectives, a prescription which is compatible with evaluation procedures including the placement of appropriate resources at each particular stage of the student-teaching learning transaction. If this approach as suggested is used, then appropriate testing procedures, including evaluation procedures, would take different meaning as it relates to the process of instruction and as it relates to children. In addition, the resources of any district could be reordered in a new priority using a different setting of instructional modes of learning.

Conclusion

The Madison Public Schools is currently moving in this direction with community, university, administration, and teacher involvement. The Madison Public Schools will and is developing a viable, meaningful testing program that is in line with the initial charge given to the Director of Curriculum. Within the next few years this new testing program should begin to pay dividends as it relates to program evaluation. This testing program will allow teachers to utilize diagnostic skills as they relate to the abilities of youngsters in a meaningful fashion while also insuring the development of meaningful, appropriate curriculum materials relating to learning areas of youngsters. In addition, the maturity that will develop within the district as an outgrowth of a sound testing program will maximize for itself a leadership style as it reflects a viable educational model not only in Madison, but in the nation.

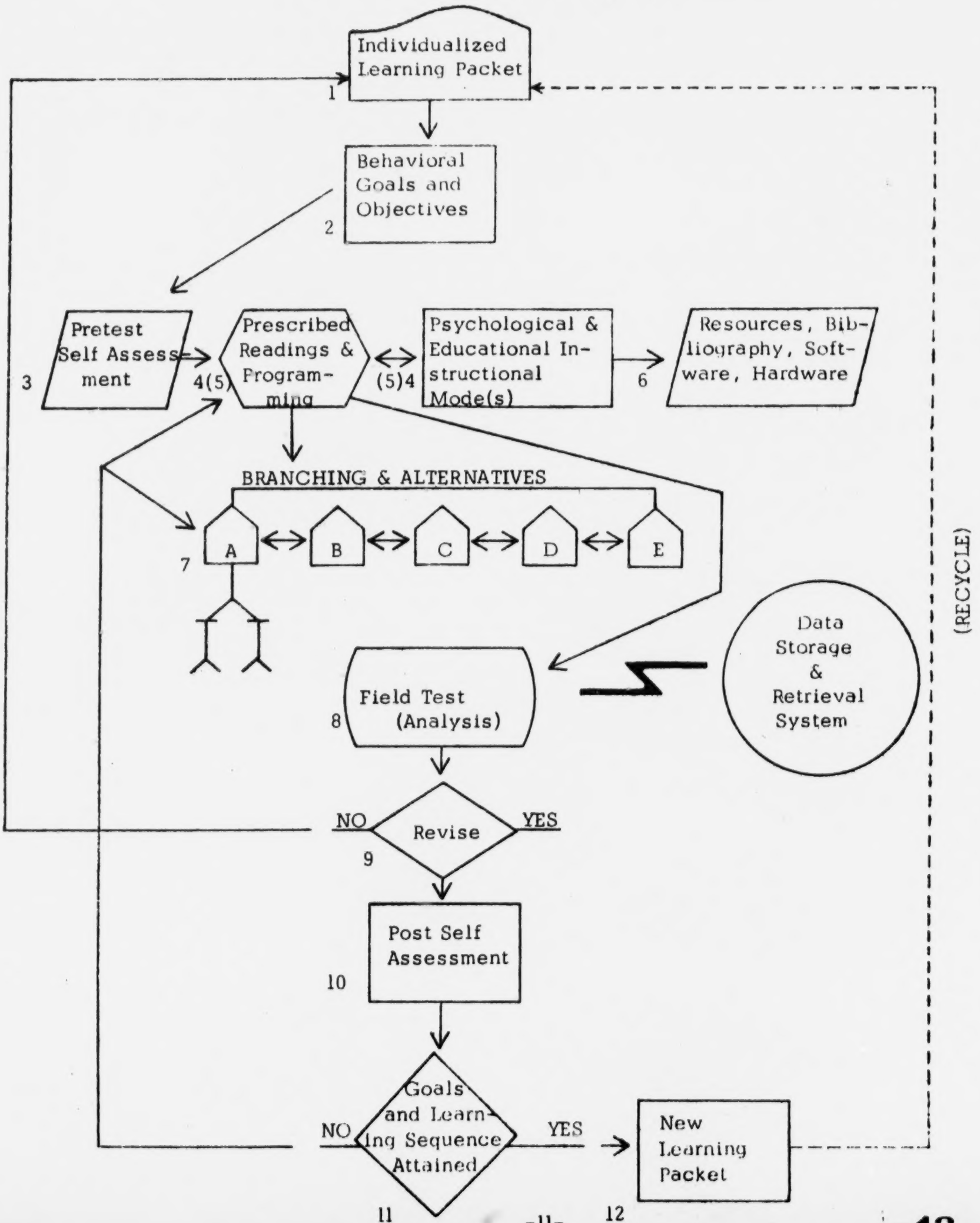
Appendix A

The Structure of Intellect
J.P. Guilford



Appendix B

An Individualized Learning Packet Design
Carmelo V. Sapone



Appendix C

Outline of Piaget's Periods of Cognitive Development

"SENSORY-MOTOR PERIOD (FIRST TWO YEARS)

Stage I (0-1 month) -- Characterized by neonatal reflexes and gross, uncoordinated body movements. Stage of complete egocentrism with no distinction between self and outer reality; no awareness of self as such.

Stage II (1-4 months) -- New response patterns are formed by chance from combinations of primitive reflexes. The baby's fist accidentally finds its way into his mouth through a coordination of arm moving and sucking.

Stage III (4-8 months) -- New response patterns are coordinated and repeated intentionally in order to maintain interesting changes in the environment.

Stage IV (8-12 months) -- More complex coordinations of previous behavior patterns, both motor and perceptual. Baby pushes aside obstacles or uses parent's hand as a means to a desired end. Emergence of anticipatory and intentional behavior; beginning or search for vanished objects.

Stage V (12-18 months) -- Familiar behavior patterns varied in different ways as if to observe different results. Emergence of directed groping toward a goal, and of new means-end manipulations for reaching desired objects.

Stage VI (1 1/2 - 2 years) -- Internalization of sensory-motor behavior patterns and beginnings of symbolic representation. Invention of new means through internal experimentation rather than external trial and error.

PREOPERATIONAL PERIOD (TWO TO SEVEN YEARS)

Characterized by egocentric thinking expressed in animism, artificialism, realism, and magic omnipotence.

Preconceptual Stage (2-4 years) -- Development of perceptual constancy and of representation through drawings, language, dreams, and symbolic play. Beginnings of first overgeneralized attempts at conceptualization, in which representatives of a class are not distinguished from the class itself (e.g. all dogs are called by the name of the child's own dog).

Perceptual or Intuitive Stage (4-7 years) -- Prelogical reasoning appears, based on perceptual appearances untempered by reversibility (e.g. Grandma in a new hat is no longer recognized as Grandma). Trial and error may lead to an intuitive discovery of correct relationships, but the child is unable to take more than one attribute into account at one time (e.g., brown beads cannot at the same time be wooden beads).

CONCRETE OPERATIONAL PERIOD (SEVEN TO ELEVEN YEARS)

Characterized by thought that is logical and reversible. The child understands the logic of classes and relations and can coordinate series and part-whole relationships dealing with concrete things.

FORMAL OPERATIONAL PERIOD (ELEVEN YEARS TO ADULTHOOD)

Characterized by the logic of propositions, the ability to reason from a hypothesis to all its conclusions, however theoretical. This involves second-order operations, or thinking about thoughts or theories rather than concrete realities." [4]

Appendix D

"Ten Categories of Learned Behavior"[5]
Merrill

Emotional	Emotional (Signal Learning)		
Psychomotor	Topographic	Chaining	Complex Skill
Memorization	Naming	Serial Memory	Discrete Memory
Complex Cognitive	Classification	Analysis	Problem Solving

Appendix E

"A Comparison Of
Bloom, Gagne and Merrill"[6]

BLOOM				Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	
GAGNE	Signal Learning	Stimulus-Response Learning	Chaining	Verbal Association	Multiple Discrimination	Concept Learning	Principle Learning	Problem Solving		
MERRILL		Psychomotor Behavior		Memorization Behavior		Classification Behavior	Analysis Behavior	Problem Solving Behavior		

FOOTNOTES

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6. Op. cit. Tennyson and Merrill, p. 29.

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